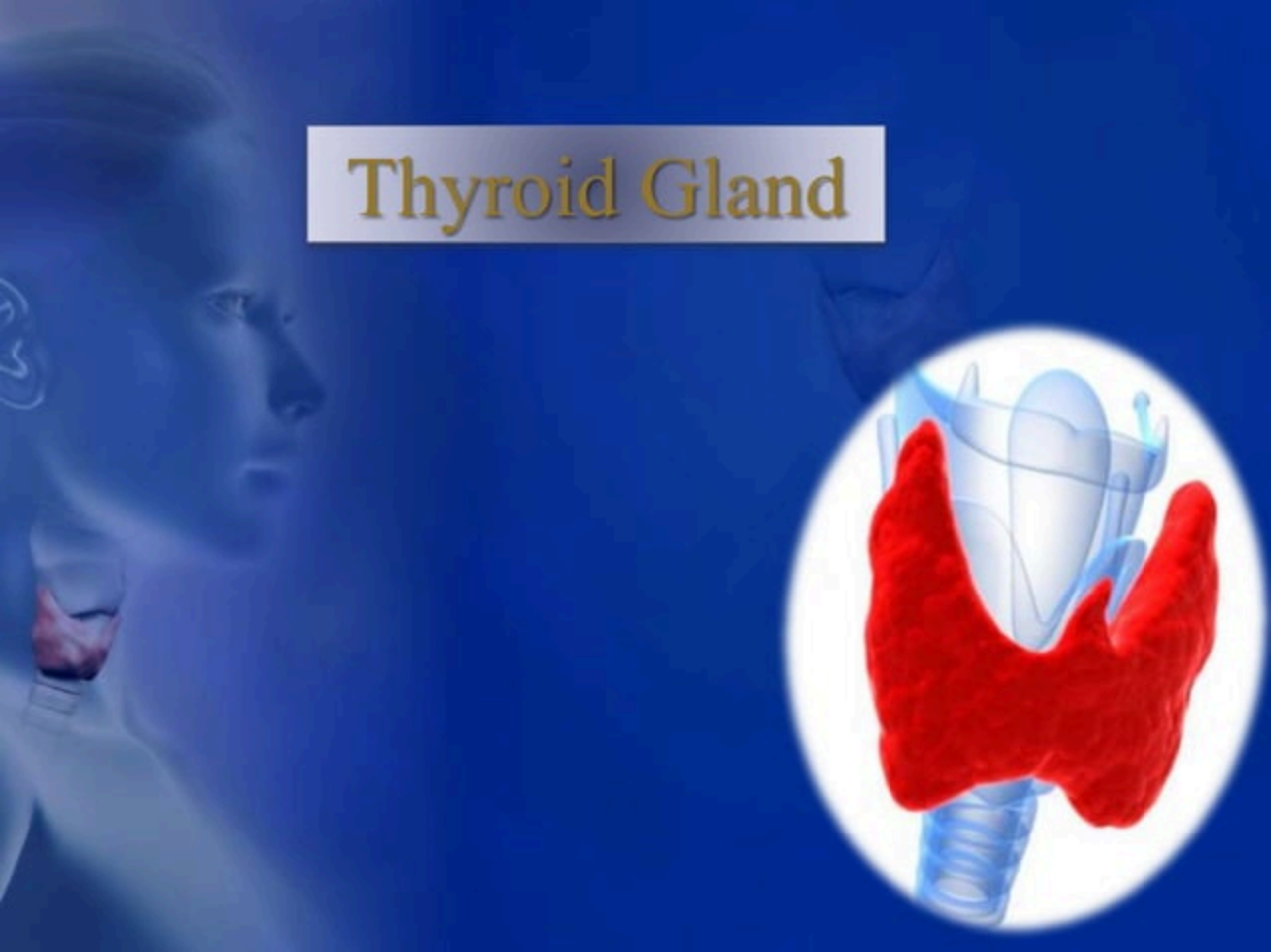
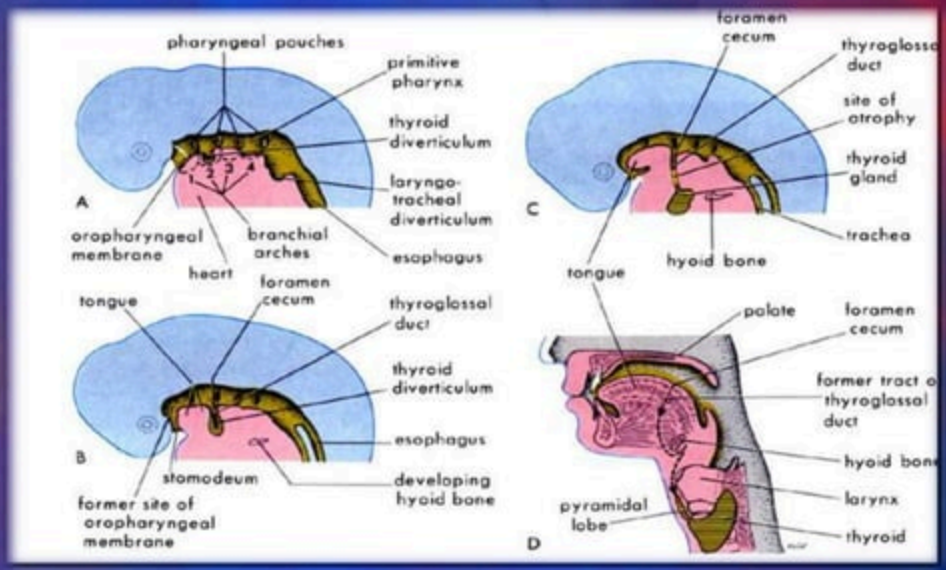
Thyroid Gland



Embryology of thyroid gland

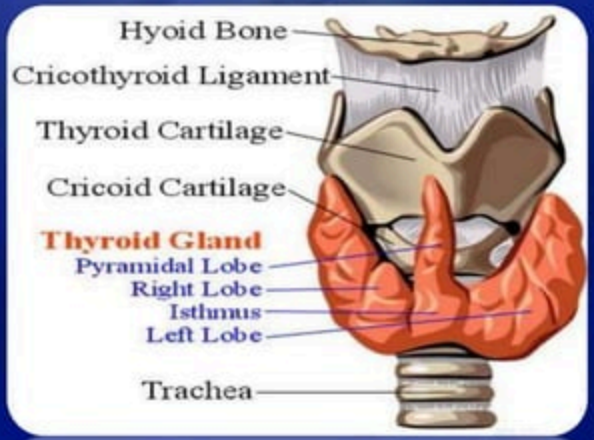
Originates from an envagination of the floor of the pharynx.



Thyroid Gland

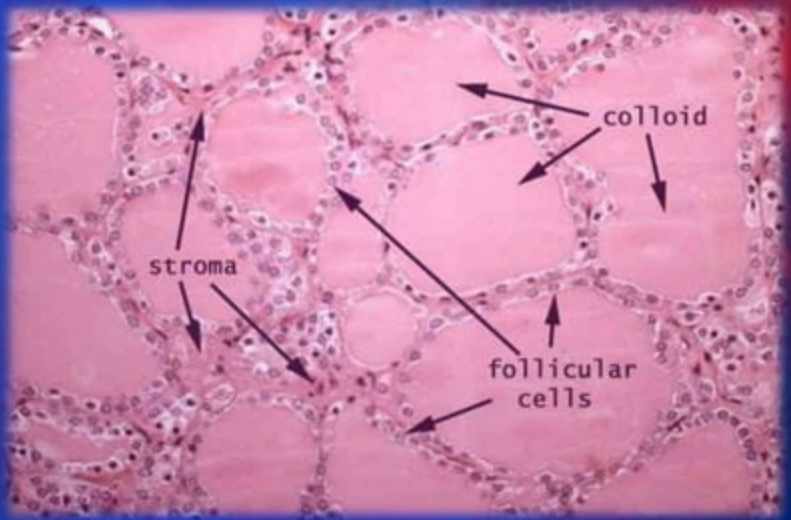
The thyroid gland is one of the largest endocrine glands.

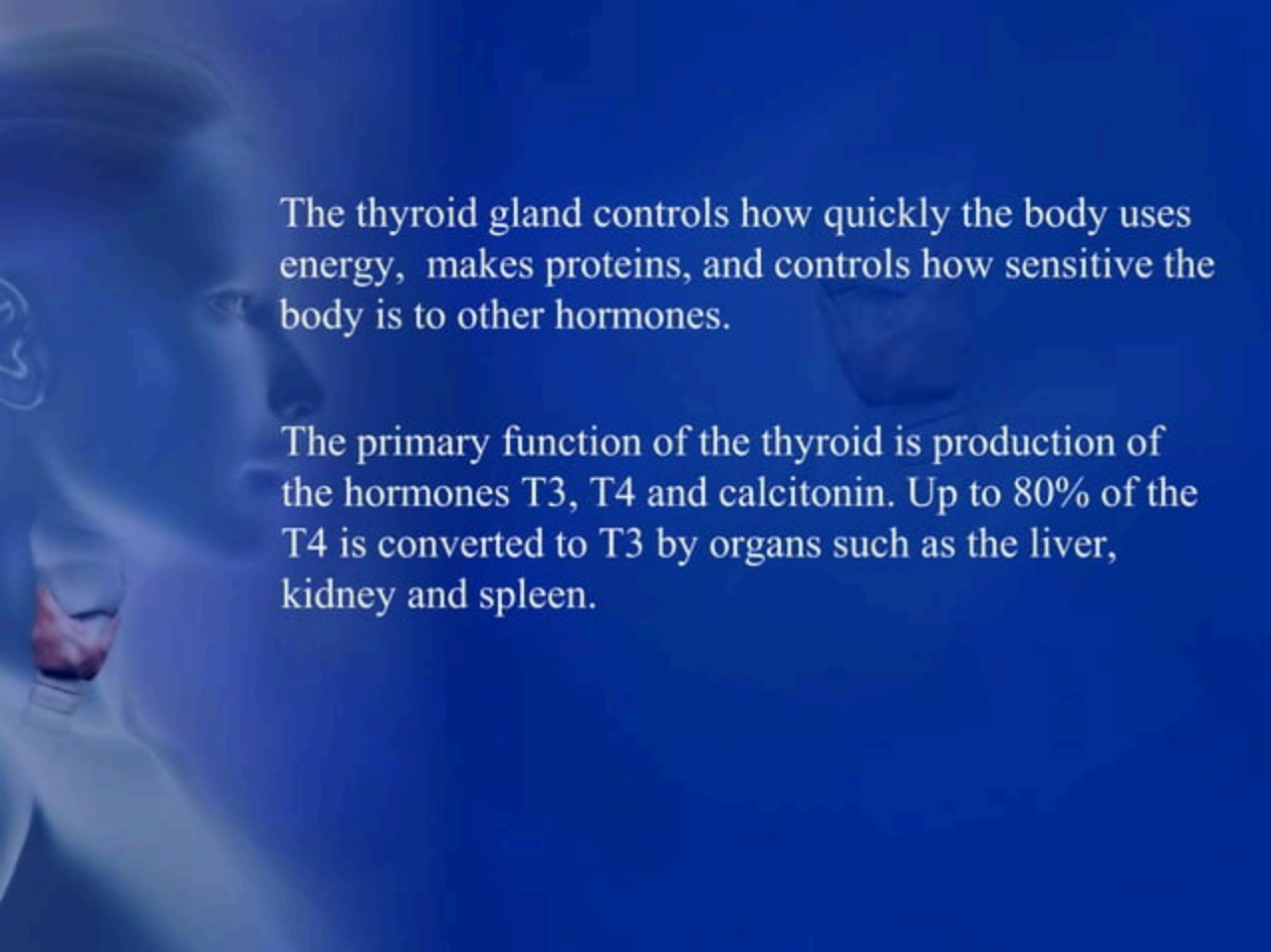
Site : found in the neck, below the thyroid cartilage , two lobes connected by isthmus .



Histology of the Thyroid Gland

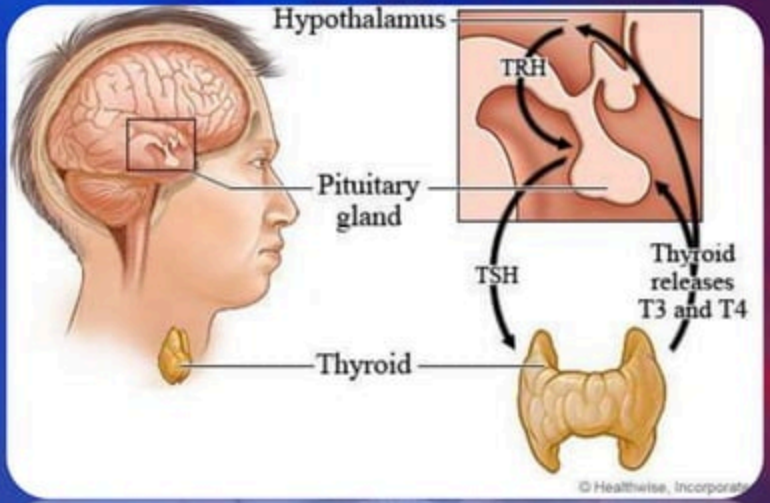
The thyroid gland contains numerous follicles, composed of epithelial follicle cells and colloid.
Also, between follicles are clear parafollicular cells, which produce calcitonin





The thyroid gland controls how quickly the body uses energy, makes proteins, and controls how sensitive the body is to other hormones.

The primary function of the thyroid is production of the hormones T3, T4 and calcitonin. Up to 80% of the T4 is converted to T3 by organs such as the liver, kidney and spleen.



Differences between T4 and T3

The thyroid secretes about 80 microg of T4, but only 5 microg of T3 per day.

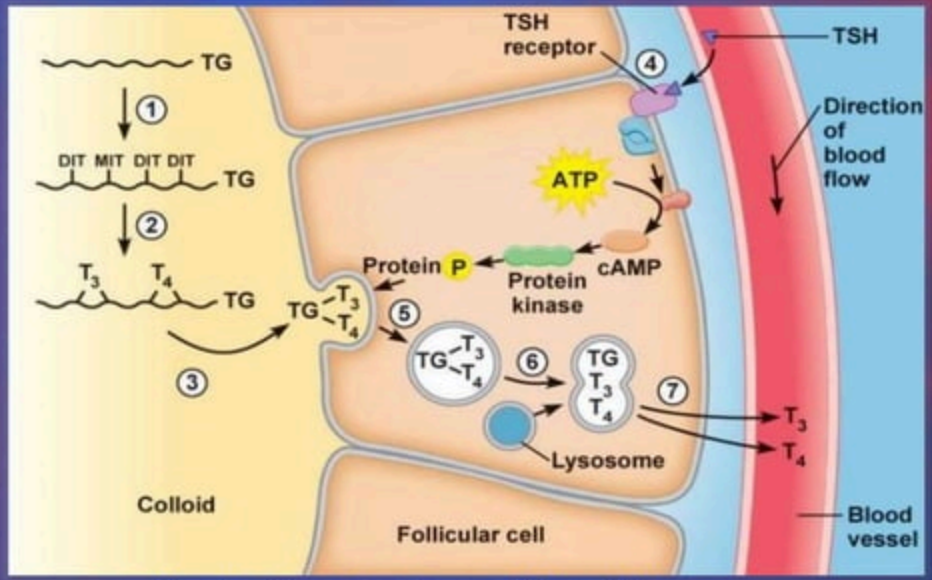
However, T3 has a much greater biological activity than T4.

Synthesis of thyroid hormone

- iodine trapping :uptake of iodine by the thyroid gland
- oxidation of iodine: (to its active form)
  thyroid peroxidase (key enzyme of the synthesis)
- iodination : Iodine attach to tyrosine within thyroglobulin productions: MIT and DIT
- formation of T4 and T3 from MIT and DIT : thyroid peroxidase

Storage

store in the colloid droplets of thyroglobulin



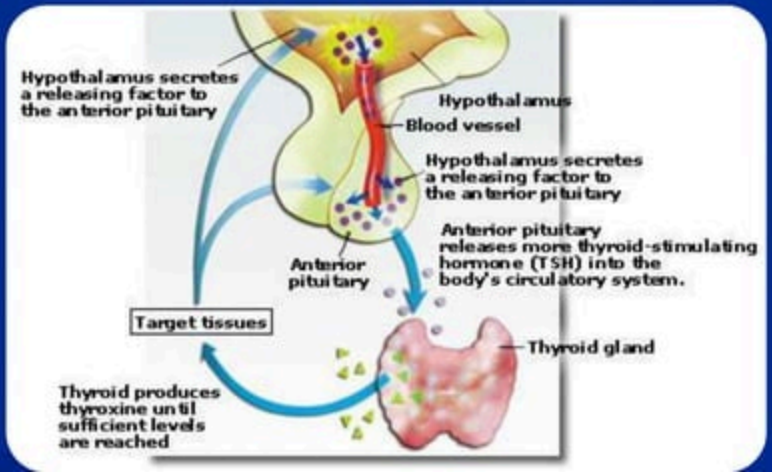
Synthesis and release of thyroid hormone

Transport of Thyroid Hormones

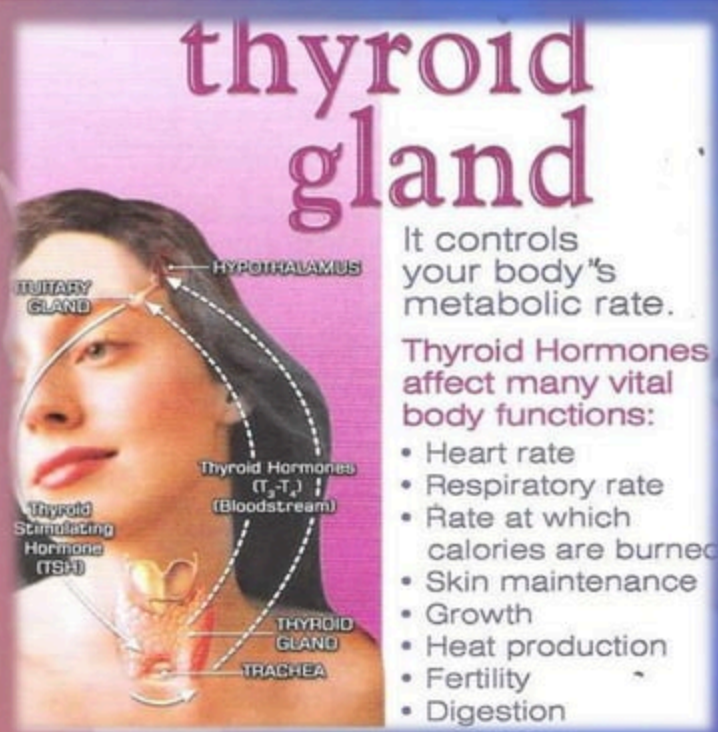
- Thyroid hormone are found in the circulation associated with binding proteins:

  Thyroid Hormone-Binding Globulin (~70% of hormone)
  Pre-albumin (transthyretin), (~15%)
  Albumin (~15%) .

- Less than 1% of thyroid hormone is found free in the circulation.



Function of the thyroid hormone



1-Regulates of BMR

2-Increases mitochondrial oxidative phosphorylation (ATP production) .

3-Increases activity of adrenal medulla .

4-Increases oxygen consumption in most target tissues

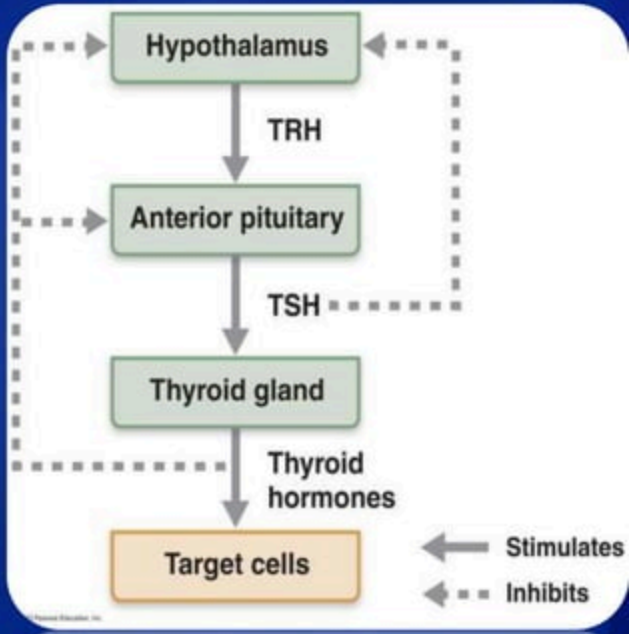
5- Increase of heart rate and force of contraction .

6-Protein synthesis is greatly increase as well as the rate of protein catabolism .

7-Stimulation of carbohydrate and fat metabolism .

8- Increases intestinal glucose reabsorption

9-Growth and development of the brain (fetal life , the first few years of postnatal life) .

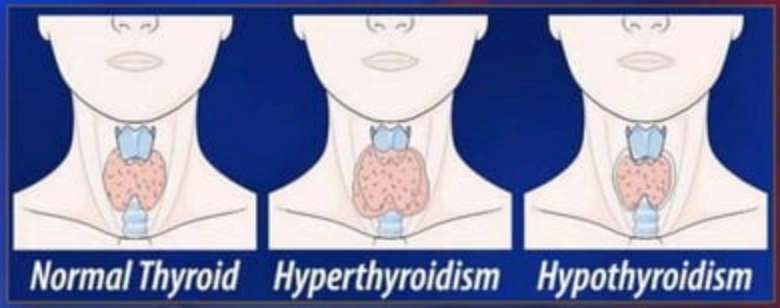


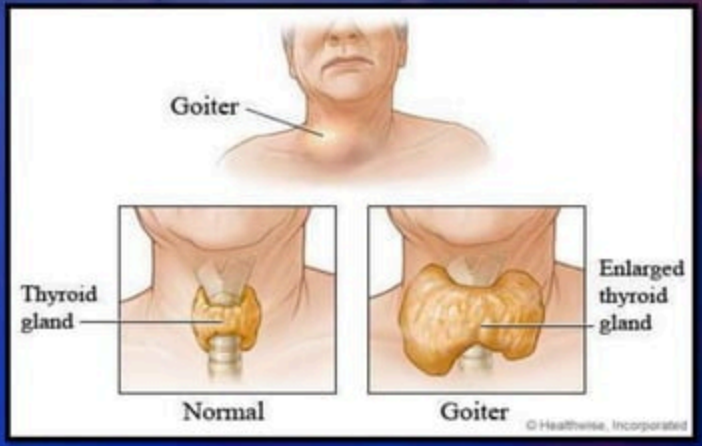
Thyroid Disorders

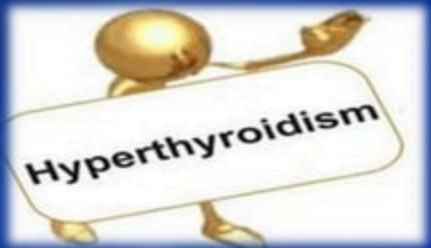
- hyperthyroidism (abnormally increased activity)

- hypothyroidism (abnormally decreased activity)

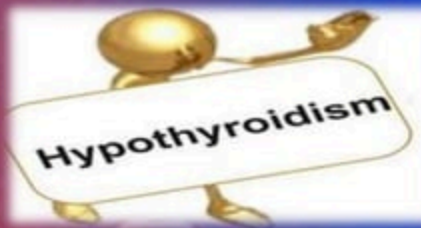
-thyroid nodules called goiter (enlarged thyroid) is associated with Hypothyroidism hyperthyroidism







- Excessive sweating
- Heat intolerance
- Increased bowel movements
- Tremor (usually fine shaking)
- Nervousness; agitation
- Rapid heart rate
- Weight loss
- Fatigue
- Decreased concentration
- Irregular and scant menstrual flow



- Tiredness, Weakness, Fatigue
- Social withdrawal and Depression
- Weight gain and Hoarseness
- Cold intolerance and Raynaud's phenomenon
- Decreased sweating
- Thick coarse hair
- Facial myxedema
- Loss of lateral third of the eyebrows
- Cold dry thickened skin
- Constipation

goiter

-A visible swelling at the base of your neck
-A tight feeling in your throat
-Coughing
-Hoarseness
-Difficulty swallowing
-Difficulty breathing

Hyperthyroidism causes :

Graves' disease it is autoimmune disease , and may lead to enlargement of thyroid and cause goiter

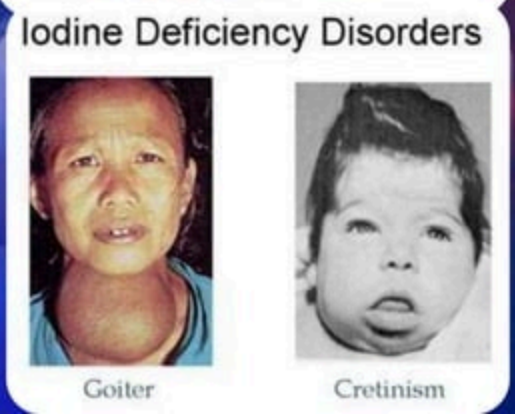
Hypothyroidism may occur as a result of

Congenital thyroid abnormalities (Thyroid deficiency at birth)

Hashimoto's thyroiditis , caused by inflammation of the thyroid gland (autoimmune) .

The removal of the thyroid

Iodine deficiency (symptoms : goiter , Cretinism)



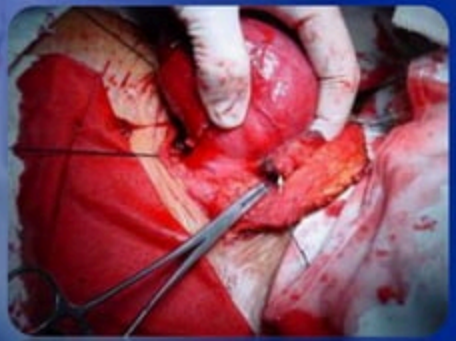
Treatment of thyroid disorder

Hyperthyroidism

Treated by :

-Medically by antithyroid drugs

-surgically by remove of gland



Hypothyroidism

treated by :
-increase intake of iodine through salt or food .
-boosting thyroid hormone with thyroxine tablet (if it results from damage of thyroid)

Goiter

Treated by

-Antithyroid drugs : have 2 types

Drugs blocking iodide trapping e.g monovalent anions

Drugs blocking binding of iodine

(thiocarbamide- thiourea – thiouracil)

-Natural to avoid it

Food like carrots – cabbage

– rutabagas – turnips


The Thyroid
The Body's Butterfly
Thank
You